PROBLEMS FOR SOLUTION.

ARITHMETIC.

138. **Proposed by F. M. PRIEST, Mona House, St. Louis, Mo.**

"A pound of gold may be drawn into a wire that would extend around the earth." What would be the diameter of such a wire if the specific gravity of gold is 19.36 and the distance is 24,900 miles?

139. **Proposed by F. P. MATZ, M. Sc., Ph. D., Professor of Mathematics and Astronomy, Irving College, Mechanicsburg, Pa.**

The *ratio* of the interest to the true discount on a certain principal for a certain time at a certain rate per cent. per annum, is $m=21$ to $n=20$. What is the rate per cent.?

⁂ Solutions of these problems should be sent to B. F. Finkel not later than March 10.

ALGEBRA.

127. **Proposed by J. SCHEFFER, A. M., Hagerstown, Md.**

Sum to n terms the series

$$\frac{4}{1.2.3}\cdot\frac{1}{3}+\frac{5}{2.3.4}\cdot\frac{1}{3^2}+\frac{6}{3.4.5}\cdot\frac{1}{3^2}+\ldots.$$

128. **Proposed by ELMER SCHUYLER, B. Sc., Teacher of German and Mathematics, Boys' High School, Reading, Pa.**

Solve $(1+x^3)(1+x^2)(1+x)=30x^3$.

129. **Proposed by F. ANDEREGG, A. M., Professor of Mathematics, Oberlin College, Oberlin, Ohio.**

$$\text{Prove } f(x)=e^{e^x}=e+\sum_{r=1}^{r=\infty} a_r x^r, \text{ where } a^r=\frac{1}{r\,!}\sum_{\kappa=1}^{\kappa=\infty}\frac{\varkappa^r}{\varkappa\,!}.$$

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GEOMETRY.

157. **Proposed by WILLIAM HOOVER, A. M., Ph. D., Professor of Mathematics and Astronomy, Ohio University, Athens, Ohio.**

Find the locus of the center of a circle touching a given line and always passing through a given point.

158. **Proposed by JOHN MACNIE, A. M., Professor of Latin, University of North Dakota.**

Show by a simple diagram that:

(*a*) If the angle-sum of an equilateral triangle is constant, that constant is a straight angle.

(*b*) If the angle-sum is less than a straight angle, the sum increases as the triangle grows less.

(*c*) If the angle-sum is greater than a straight angle, the sum decreases as the triangle grows less.

159. Proposed by FRANCIS W. HANAWALT, Professor of Mathematics and Astronomy, Iowa Wesleyan University, Mt. Pleasant, Iowa.

A man desires to lay out a half mile race course by using two circles of 150 feet radius and their internal tangents. How far apart shall the circles be placed?

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CALCULUS.

119. Proposed by JOHN M. COLAW. A. M., Monterey, Va.

Rectify the Folium of Descartes, the equation of which is $x^3+y^3+3axy=0$.

120. Proposed by G. B. M. ZERR, A. M., Ph. D., Professor of Chemistry and Physics, The Temple College, Philadelphia, Pa.

The axis of a paraboloid of revolution coincides with the generating line of a cylinder; the diameter of the cylinder and the latus-rectum of the parabola are each equal to the common altitude, a. Find the surface and volume of each part into which the paraboloid is divided by the cylinder.

121. Proposed by W. W. LANDIS, A. M., Professor of Mathematics and Astronomy, Dickinson College, Carlisle, Pa.

Solve the differential equation $\left[\dfrac{d}{dx}+b\right]^n y=\cos ax$.

122. Proposed by B. F. FINKEL. A. M., M. Sc.. Professor of Mathematics and Physics. Drury College, Springfield, Mo.

Solve the differential equation $(y-x)\sqrt{(1+x^2)}\dfrac{dy}{dx}=n(1+y^2)^{\frac{3}{2}}$.

123. Prize Problem. Proposed by B. F. FINKEL, A. M., M. Sc., Professor of Mathematics and Physics in Drury College, Springfield, Mo.

Find in finite terms, the value of $\int_0^{\frac{1}{4}\pi}\tan\phi d\phi$.

A year's subscription to the MONTHLY will be given to the person sending to the Proposer the first solution of this problem.

*** Solutions of these problems should be sent to J. M. Colaw not later thah March 10.

MECHANICS.

107. Proposed by B. F. FINKEL, A. M., M. Sc., Professor of Mathematics and Physics in Drury College, Springfield, Mo.

A rough uniform rod, length $2a$, is placed with a length $c(>a)$ projecting over the edge of the table. Prove that the rod will begin to slide over the edge when it has turned through an angle $\tan^{-1}\left[\dfrac{\mu a^2}{a^2+9(c-a)^2}\right]$.

[From Loudon's *Rigid Dynamics*.]